

PATENT COOPERATION TREATY

**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>BP106014/JK</b>	<b>FOR FURTHER ACTION</b> See Form PCT/IPEA/416	
International application No. <b>PCT/FI2003/000573</b>	International filing date (day/month/year) <b>18.07.2003</b>	Priority date (day/month/year) <b>19.06.2003</b>
International Patent Classification (IPC) or national classification and IPC <b>H04B 7/185</b>		
<p>Applicant: <b>Nokia Corporation et al</b></p>		

<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>4</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of <u>8</u> sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>																	
<p>4. This report contains indications relating to the following items:</p> <table> <tbody> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I Basis of the report</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. VI Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VII Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VIII Certain observations on the international application</td> </tr> </tbody> </table>		<input checked="" type="checkbox"/>	Box No. I Basis of the report	<input type="checkbox"/>	Box No. II Priority	<input type="checkbox"/>	Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input checked="" type="checkbox"/>	Box No. VI Certain documents cited	<input type="checkbox"/>	Box No. VII Certain defects in the international application	<input type="checkbox"/>	Box No. VIII Certain observations on the international application
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Date of submission of the demand <b>07.01.2005</b>	Date of completion of this report <b>20.09.2005</b>
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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2003/000573

## Box No. I Basis of the report

1. With regard to the language, this report is based on:

the international application in the language in which it was filed

a translation of the international application into \_\_\_\_\_  
which is the language of a translation furnished for the purposes of:

international search (Rules 12.3(a) and 23.1(b))

publication of the international application (Rule 12.4(a))

international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

the international application as originally filed/furnished

the description:

pages 1-4, 7-14

as originally filed/furnished

pages\* 5-6

received by this Authority on

30.06.2005

pages\*

received by this Authority on

the claims:

pages

as originally filed/furnished

pages\*

as amended (together with any statement) under Article 19

pages\* 15-20

received by this Authority on

30.06.2005

pages\*

received by this Authority on

the drawings:

pages 1-7

as originally filed/furnished

pages\*

received by this Authority on

pages\*

received by this Authority on

a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3.  The amendments have resulted in the cancellation of:

the description, pages \_\_\_\_\_

the claims, Nos. \_\_\_\_\_

the drawings, sheets/figs \_\_\_\_\_

the sequence listing (specify): \_\_\_\_\_

any table(s) related to the sequence listing (specify): \_\_\_\_\_

4.  This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

the description, pages \_\_\_\_\_

the claims, Nos. \_\_\_\_\_

the drawings, sheets/figs \_\_\_\_\_

the sequence listing (specify): \_\_\_\_\_

any table(s) related to the sequence listing (specify): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2003/000573

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Claims	1-38	YES
	Claims		NO
Inventive step (IS)	Claims	1-38	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-38	YES
	Claims		NO

**2. Citations and explanations (Rule 70.7)****Documents cited in the International Search Report:**

D1: WO 9948312 A1

D2: WO 9912227 A2

D3: EP 1096699 A2

D4: Brisco C et al. "An automated emulator of mobile satellite link" sept, 1997, 27<sup>th</sup> European Microwave 97 Conference and exhibition. Pages 279-284, vol. 1, Israel

D5: US 2002183054 A1

The cited documents represent the general state of the art. The invention defined in claims 1-38 is not disclosed by any of these documents.

The cited prior art differ from the claimed invention in that neither of the documents describe a communication arrangement and method between two units via a satellite and emulating signalling during periods when there is no communication via the satellite. Therefore, the claimed invention is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1-38 is novel and is considered to involve an inventive step. The invention is industrially applicable.

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

International application No.

PCT/FI2003/000573

**Box No. VI Certain documents cited****1. Certain published documents (Rule 70.10)**

Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
US 2003194987 A1	16/10/2003	15/04/2002	- - -

**2. Non-written disclosures (Rule 70.9)**

Kind of non-written disclosure	Date of non-written disclosure (day/month/year)	Date of written disclosure referring to non-written disclosure (day/month/year)

SIAP20 Rec'd PCT/PTO 16 DEC 2005

In accordance with the invention there is also provided a communication method for communication between a first network unit inside a vehicle and a second network unit of a terrestrial mobile communication system, wherein said communication is directed via a satellite, the method being characterized in that the method comprises:

- establishing the satellite connection when information transfer between the first network unit and the second network unit is required,
- releasing the satellite connection when information transfer between the first network unit and the second network unit is not required,
- 10 - emulating signalling of the second network unit for the first network unit during a released state of the satellite connection, and
- emulating signalling of the first network unit for the second network unit during the released state of the satellite connection.

In accordance with the invention there is also provided a communication arrangement comprising a first network unit for wireless communication with mobile stations inside a vehicle and a fixed second network unit of a terrestrial mobile communication system, the system comprising means for communicating between the first network unit and the second network unit via a satellite, the arrangement being characterized in that the arrangement further comprises

- 20 - means for establishing the satellite connection when information transfer between the first network unit and the second network unit is required,
- means for releasing the satellite connection when information transfer between the first network unit and the second network unit is not required,
- means for emulating signalling of the second network unit for the first network unit during a released state of the satellite connection, and
- 25 - means for emulating signalling of the first network unit for the second network unit during the released state of the satellite connection.

The invention further relates to a first network unit arrangement for wireless communication with mobile stations inside a vehicle and a fixed second network unit of a terrestrial mobile communication system, the first network unit comprising means for communicating information with a second network unit via a satellite, the ar-

angement being characterised in that the arrangement comprises means for emulating signalling of the second network unit for the first network unit during periods when there is no communication via the satellite between the first network unit and the second network unit.

5. Some preferred embodiments of the invention are described in dependent claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Some embodiments of the invention will be described in detail below, by way of example only, with reference to the accompanying drawings, of which

10. Figure 1a shows an embodiment of the wireless communication system according to the invention,

Figure 1b shows an embodiment of a base station including an emulator according to the invention,

Figure 1c shows an embodiment of a base station controller including an emulator according to the invention,

15. Figure 2 shows a flow diagram of an exemplary method according to the invention for controlling satellite communication and providing state signalling,

Figure 3 shows providing call related signalling in an exemplary arrangement according to the invention,

20. Figure 4 shows providing operating and maintenance related signalling in an exemplary arrangement according to the invention,

Figure 5a shows a second exemplary arrangement for providing call and packet data transmission, wherein packet data is transferred directly via satellite land station and Internet,

25. Figure 5b shows a third exemplary arrangement for providing call and packet data transmission, wherein call data and packet data are both transferred using IP protocol, and

Figure 6 shows an exemplary arrangement according to the invention for providing handovers between several satellites and related terrestrial networks.

#### DETAILED DESCRIPTION

**Claims**

1. A communication method for communication between a first network unit inside a vehicle and a second network unit of a terrestrial mobile communication system, wherein said communication is directed via a satellite, **characterized** in that the method comprises:
  - establishing the satellite connection when information transfer between the first network unit and the second network unit is required,
  - releasing the satellite connection when information transfer between the first network unit and the second network unit is not required,
10. - emulating signalling of the second network unit for the first network unit during a released state of the satellite connection, and
  - emulating signalling of the first network unit for the second network unit during the released state of the satellite connection.
15. 2. A communication method according to claim 1, **characterized** in that said signalling is LAPD link and Abis signalling.
3. A communication method according to claim 1, **characterized** in that said emulating signalling of the second network unit comprises transferring state messages with the first network unit.
20. 4. A communication method according to claim 1, **characterized** in that said emulating signalling of the first network unit comprises transferring state messages with the second network unit.
5. A communication method according to claim 2, **characterized** in that during the on state of the satellite connection capacity is reserved dynamically for the Abis link, based on the data transfer requirement.
25. 6. A communication method according to claim 1, **characterized** in that additional data according to Internet Protocol (IP) is transferred between the first network unit and Internet via the satellite, wherein the communication between the first network unit and the second network unit is prioritized higher in the satellite communication than the IP data transferred between the first network unit and the Internet.

7. A communication method according to claim 5, characterized in that the data transferred between the first network unit and the second network unit is transferred as packet data according to Internet Protocol.

8. A communication method according to claim 1, wherein the vehicle is an aircraft, characterized in that the method comprises receiving flight status information from the avionics of the aircraft for controlling the first network unit.

9. A communication method according to claim 8, characterized in that said on the basis of the received flight status information communications between the first network unit and mobile stations inside the aircraft are barred while keeping mobile stations camped to the first network unit.

10. A communication method according to claim 8, characterized in that the flight status information comprises at least one of the following information: flight altitude, position and heading, doors open/closed, activate/deactivate mobile communications.

11. A communication method according to claim 1, characterized in that the method comprises steps for:

- receiving communication information on another satellite and another second network unit,
- establishing communications between the first network unit and the other second network unit via the other satellite on the basis of the received communication information, and
- releasing the communication between the first network unit and the second network unit via the satellite.

12. A communication method according to claim 1, characterized in that the information transfer is compliant with at least one of the following communication specifications: GSM, PCN, PCS, HSCSD, GPRS, EDGE, CDMA, WCDMA, Bluetooth, UMTS, Teldesic, Iridium, Inmarsat and WLAN.

13. A communication method according to claim 1, characterized in that a wireless connection between the mobile terminal and the first network device is established by a wireless network inside the vehicle.

14. A communication arrangement comprising a first network unit for wireless communication with mobile stations inside a vehicle and a fixed second network unit of a terrestrial mobile communication system, the system comprising means for communicating between the first network unit and the second network unit via a satellite, characterized in that the arrangement further comprises

- means for establishing the satellite connection when information transfer between the first network unit and the second network unit is required,
- means for releasing the satellite connection when information transfer between the first network unit and the second network unit is not required,

10. - means for emulating signalling of the second network unit for the first network unit during a released state of the satellite connection, and

- means for emulating signalling of the first network unit for the second network unit during the released state of the satellite connection.

15. A communication arrangement according to claim 14, characterized in that said signalling is LAPD link and Abis signalling.

16. A communication arrangement according to claim 14, characterized in that said means emulating signalling of the second network unit comprises means for transferring state messages with the first network unit.

17. A communication arrangement according to claim 14, characterized in that said means for emulating signalling of the base station comprises means for transferring state messages with the base station controller.

20. 18. A communication arrangement according to claim 15, characterized in said means for emulating are arranged to reserve capacity during the on state of the satellite connection dynamically for the Abis link, based on the data transfer requirement.

25. 19. A communication arrangement according to claim 14, characterized in that it comprises means for transferring additional data according to Internet Protocol (IP) the first network unit and Internet via the satellite, wherein the communication between the first network unit and the second network unit is prioritized higher in the satellite communication than the IP data transferred between the first network unit and the Internet.

20. A communication arrangement according to claim 19, characterized in that it comprises means for transferring data between the first network unit and the second network unit as packet data according to Internet Protocol.
21. A communication arrangement according to claim 12, characterized in that the vehicle is an aircraft.
22. A communication arrangement according to claim 21, characterized in that it comprises means for receiving flight status information from the aircraft for controlling the first network unit.
23. A communication arrangement according to claim 22, characterized in that the arrangement comprises means for barring communications between the first network unit and mobile stations inside the aircraft on the basis of the received flight status information, and means for keeping the mobile stations camped to the first network unit during the barred state.
24. A communication arrangement according to claim 22, characterized in that the flight status information comprises at least one of the following information: flight altitude, position and heading, doors open/closed, activate/deactivate mobile communications.
25. A communication arrangement according to claim 14, characterized in that the arrangement comprises:
  - means for receiving communication information on another satellite and another second network unit;
  - means for establishing communications between the first network unit and the other second network unit via the other satellite on the basis of the received communication information, and;
  - means for releasing the communication between the first network unit and the second network unit via the satellite.
26. A communication arrangement according to claim 14, characterized in that the information transfer is compliant with at least one of the following communication specifications: GSM, PCN, PCS, HSCSD, GPRS, EDGE, CDMA, WCDMA, Bluetooth, UMTS, Teldesic, Iridium, Inmarsat and WLAN.

27. A communication arrangement according to claim 14, characterized in that the first network unit is a base transceiver station and the second network unit is a base station controller.

28. A communication arrangement according to claim 14, characterized in that it comprises a wireless network inside the vehicle for wireless connection between a mobile terminal and the first network device.

29. A first network unit arrangement for wireless communication with mobile stations inside a vehicle and a fixed second network unit of a terrestrial mobile communication system, the first network unit comprising means for communicating information with the second network unit via a satellite, characterized in that the arrangement comprises means for emulating signalling of the second network unit for the first network unit during periods when there is no communication via the satellite between the first network unit and the second network unit.

30. A first network unit arrangement according to claim 29, characterized in that said signalling is LAPD link and Abis signalling.

31. A first network unit arrangement according to claim 29, characterized in that the first network unit is a base transceiver station and the second network unit is a base station controller.

32. A first network unit arrangement according to claim 29, characterized in that said means for emulating are arranged to reserve capacity during the on state of the satellite connection dynamically for the Abis link, based on the data transfer requirement.

33. A first network unit arrangement according to claim 29, characterized in that it is located in a moving vehicle, such as aircraft.

34. A first network unit arrangement according to claim 33, characterized in that it comprises:

- means for receiving communication information on another satellite and another second network unit,
- means for establishing communications between the first network unit and the other second network unit via the other satellite on the basis of the received communication information, and

- means for releasing the communication between the first network unit and the second network unit via the satellite.

35. A first network unit arrangement according to claim 33, characterized in that the vehicle is an aircraft that the first network unit arrangement comprises means for receiving flight status information from the aircraft for controlling the first network unit.

36. A first network unit arrangement according to claim 35, characterized in that the arrangement comprises means for barring communications between the first network unit and mobile stations inside the aircraft on the basis of the received flight status information, and means for keeping the mobile stations camped to the first network unit during the barred state.

37. A communication arrangement according to claim 35, characterized in that the flight status information comprises at least one of the following information: flight altitude, position and heading, doors open/closed, activate/deactivate mobile communications.

38. A first network unit arrangement according to claim 29, characterized in that the first network unit is a base station controller and the second network unit is a base transceiver station.